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ABSTRACT

One principal's criterion for proper decision-making information may be much different from that of another. Information providers need to decide what constitutes relevant information when communicating to decision-makers. Fifty-three principals and 11 assistant principals were administered two indicator tests to investigate the relationship between Jungian-based cognitive styles and preferences in information types. The first test categorized participants into four decision-making styles: sensing/thinking (40.6 percent); sensing/feeling (26.6 percent); intuition/thinking (17.2 percent); and intuition feeling (15.6 percent). No clearly dominant information style preference emerged. Disseminators of information should provide a variety of styles and forms of information to schools. Three findings warrant future research: patternings of cognitive style and information preference; evidence that the thinking/feeling personality dimension exerts a strong influence on information preference; and test scenarios that elicited response patterns different from the norm suggest that context may have an influence on information preferences independent of cognitive style. Data are appended in 16 tables. (37 references) (EJS)

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THE INFLUENCE OF COGNITIVE STYLE ON INFORMATION PREFERENCES AMONG SCHOOL PRINCIPALS

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ABSTRACT

The present study investigated the relationship between the Jungian-based cognitive styles of school principals and the kinds of information they value as important in making school related decisions. A canonical correlation analysis measured correlations between scores on the Myers-Briggs Type Indicator (MBTI) (Briggs & Myers, 1976) and the Information Preference Questionnaire. Multivariate commonality and a Procrustean rotation invariance procedure were performed on the data.

THE INFLUENCE OF COGNITIVE STYLE ON INFORMATION PREFERENCES AMONG SCHOOL PRINCIPALS

School principals are faced daily with a variety of decisions they must make; some must be made spontaneously, while others require indepth analysis. Decisions that school principals make require that proper information be at their disposal. Yet the criteria for proper information for one decision maker may not be the criteria for another decision maker. In the present era which has often been called the information age, during which historical concerns over information scarcity have been replaced by complaints of information overload (Rowe & Mason, 1987), the question arises: how do providers of information decide what constitutes relevant or useful information when communicating evaluation, assessment, or survey results to these decision makers? Several lines of research have attempted to answer this question by studying the personal characteristics of decision makers as information processors. One theory contends that individuals' predispositions influence how they view organizations and how they filter out as unimportant those kinds of information which do not fit into their "frames" of reality. Another body of research contends that individuals' psychological/cognitive styles influence how they perceive information and how they make decisions based on that information. If those who are responsible for providing information to educational decision makers and who want to influence decisions knew about preference-sensitive information types and sources, the relevance and usefulness of their efforts would be enhanced. Weiss (1982) has argued that information providers must "learn (1) which kinds of people (2) in which kinds of contexts (3) make which kinds of uses (4) of which kinds of research and evaluation (5) with what range of consequences" (p. 143).

An emerging interest among those who study organizational behavior focuses on the personal "frames" or predispositions that organizational participants

bring to their work in organizations. Foster (1986) contends that new approaches to organizational theory have used unusual metaphors in an "attempt to discover a parallel between our ways of organizing and our ways of seeing" (p. 128). Bolman and Deal (1984) call individuals' predispositions toward viewing organizations "frames." They argue that "frames help us to order the world and decide what action to take" (p. 4) and that "every manager uses a personal frame, or image, of organizations to gather information, make judgments, and get things done" (p. 4). Morgan (1986) views organizations through competing "metaphors." He contends that "the use of metaphors implies a *way of thinking* and a *way of seeing* that pervade how we understand our world generally" (p. 12, emphases in original). Other recently designed paradigms which follow this notion are "linkages" (Firestone & Wilson, 1985) and "corporate culture" (Deal & Kennedy, 1982).

"Framing" or "imaging" organizations raises a fundamental question about decision makers: do they tend to filter out certain kinds of information because of their predispositions toward viewing organizations? Bolman and Deal (1984) assume that the selective process does take place by comparing their notion of frames to "windows on the world . . . [that] filter out some things while allowing others to pass through easily" (p. 4).

Another related body of research—which is the basis for the study reported here—supports the contention that personality, or "cognitive style," influences the kinds of information which individuals value as important in making decisions. Since cognitive style research also considers predispositions of individuals toward viewing organizations and their manner of filtering through information for purposes of decision making, advocates of the newer paradigms of "frames of reference" and "organizational metaphors" might be advised to consider cognitive style research, which has a strong research base and a longstanding

theoretical framework in Jung's (1923) theory of psychological type.

The crux of Jung's (1923) theory is that individuals perceive information either through sensing or through intuition, and they make judgments on their perceived information either through thinking or through feeling. An individual oriented toward sensing becomes aware of people and objects primarily through the five senses and thus attends to the facts as they literally exist in reality, while an individual oriented toward intuition becomes aware of the potentialities in things through an awareness of the inner meanings and the overall relationships in the world (Jacobi, 1943). An individual oriented toward thinking uses the cognitive processes of impersonal analysis and logical reasoning in rendering judgments, while an individual oriented toward feeling seeks a subjective understanding of personal concerns of self and others when making decisions (Myers & McCaulley, 1985).

According to Jung (1923), one of the functions will become more differentiated over time and will become the dominant function, while another, less differentiated function of secondary importance will become the auxiliary function. "Naturally only those functions can appear as auxiliary whose nature is not opposed to the dominant function. For instance, feeling can never act as the second function alongside thinking, because it is by its very nature too strongly opposed to thinking" (Jung, 1923, pp. 405–406).

"Since, according to Jung, perception and judgment are independent dimensions, four decision styles emerge—Sensing/Thinking, Sensing/Feeling, Intuition/Thinking, and Intuition/Feeling" (Brightman, 1984, p. 51). These four types are labelled ST, SF, NT, and NF, respectively (Myers & McCaulley, 1985), the N referring to intuition. Each cognitive style has its unique characteristics relevant to the kinds of information preferred in making decisions.

Sensing Thinking (ST) individuals are practical and matter-of-fact types who are interested in facts because facts can be verified by their five senses. They use impersonal, logical reasoning when making decisions (Myers & McCaulley, 1985).

Sensing Feeling (SF) individuals are sympathetic and friendly types who, like the ST individuals, are interested in facts which they can gather from their five senses, but they approach decisions with personal warmth because of their trust in feeling, with its power to weigh how much things matter to themselves and to others (Myers & McCaulley, 1985).

Intuitive Feeling (NF) people are the enthusiastic and insightful types. Like the SF types, NF individuals approach decisions with subjectivity and personal warmth; however, they do not center their attention on concrete situations, but, rather, on possibilities and patterns of meanings. One major difference between SF and NF people is that NF people care about humanity in general and are ready to crusade for a just cause, while SF people are concerned about their own personal circle of friends and associates (Myers & McCaulley, 1985).

Intuitive Thinking (NT) individuals are the logical and ingenious types. Like the NF individuals, NT people prefer to use intuition to gather information and focus on possibilities, theoretical relationships, and abstract patterns, but they use impersonal analysis in their decisions (Myers & McCaulley, 1985).

Jung's theory of psychological type has been operationalized by the Myers-Briggs Type Indicator (MBTI) (Briggs & Myers, 1976), an instrument which has been repeatedly tested and validated for use in a wide range of fields. The MBTI has formed the basis for much current cognitive style research. In a recent article comparing cognitive style typologies, Frisbie (1988) argues a strong case for choosing the cognitive style typology of the MBTI.

> Combinations of sensing, intuition, thinking, and feeling are the very core of Jung's typology. . . . The four function combinations are consistent with the Jung/MBTI theory and fit will with a current recognition of cognitive psychology. Therefore, until proven otherwise, the function combinations are the most reasonable choice over other possible sets of four functions or attitudes. (p. 19)

Keen and Bronsema (1981) likewise present a strong case for using the MBTI as a general base for cognitive style research in management information systems. They demonstrate that the MBTI is a reliable and valid instrument because it meets Bagozzi's (1980) six tests of validity: conceptual, construct, convergent, discriminant, predictive, and nomological. Other personality researchers have recognized the Jung/MBTI as a valid cognitive style approach (Barger & Hoover, 1984; Carlson, 1980; Ferguson & Fletcher, 1987; Helson, 1982; Seegmiller & Epperson, 1987).

Current cognitive style research indicates that cognitive style influences the kind of information a decision maker values as important. In the field of business and management information systems, researchers have discovered that "there is an intimate connection between a person's cognitive style or personality and the type of information that he or she is even willing to label as 'information'" (Mitroff, Kilmann, & Barabba, 1979, p. 406). Watkins (1981) reiterates that notion when he states that "information systems designers need to consider the cognitive characteristics of decision makers" (p. 7). Mason and Mitroff (1973) further expand that concept by stating that "the designers of informations systems should not force all psychological types to conform to one type of information system; rather each psychological type should be given the kind of information to which he is psychologically attuned and will use most effectively" (p. 478).

If the cognitive style approach can be used in the field of business and management information systems to enhance the provision of relevant and useful information for decision making, then the same approach should likewise prove fruitful in the field of educational administration.

The purpose of the present study was to investigate the relationship between the cognitive style of school principals as measured by the MBTI and their preferences for various types of information in making decisions. Stated as a research question, the study asked: Is there a relationship between the cognitive style of school principals and the kinds of information they prefer to use in making decisions? The independent variables in the study were the raw scores received on the MBTI on the cognitive functions—sensing, intuiting, thinking, and feeling (S, N, T, and F). The dependent variables were the scores received on a self-report questionnaire, the Information Preference Questionnaire (IPQ), on which the participants chose among four types of information constructed by the author to match the four Jungian cognitive styles. The four types of information as listed in the questionnaire represent those factors which should be of primary concern for each of four cognitive styles, as reported in the literature. The IPQ contains 12 scenarios concerning school related decisions. Each scenario is followed by four choices of information, each of which was rated on a blank Likert scale for its relative importance in helping participants come to a decision. The four information preference choices (ST, SF, NT, NF) were arranged in a randomly varied order from scenario to scenario, so that participants were not aware that they rated choice A (or B, or C, or D) consistently higher than the other choices.

The Study

Fifty-three (53) principals and 11 assistant principals from a large, racially and economically mixed, metropolitan-area public school district in the

South were administered the MBTI and the IPQ. A canonical correlation analysis was performed on the data. The raw scores on the cognitive functions of the MBTI were used as the independent variables for several reasons. First, these scores provide a measurement of the magnitude of the participants' agreement with each of the cognitive functions of the two bi-polar dimensions, Sensing-Intuiting and Thinking-Feeling.

Although MBTI preference scores have often been used in cognitive style studies, preference scores are indications of the extent of an individual's agreement with only one pole of each of the two bi-polar dimensions. For example, if an individual has a higher raw score for Sensing than for Intuiting, the preference score will indicate the extent of an individual's agreement with Sensing but not with Intuiting. The present study set out to correlate the extent of each individual's agreement with all four cognitive functions and the extent of each individual's agreement with four information types. Since preference scores indicate the extent of an individual's agreement with only the preferred cognitive function but not with the non-preferred cognitive function, it was decided to use the raw scores of the Sensing-Intuiting and Thinking-Feeling dimensions. Thus, a canonical correlation could be conducted between all four cognitive functions (S, N, T, F) and all four information preference scores (ST, SF, NT, NF). Although continuous scores have often been used in correlational studies, these scores were not appropriate for the same reasons that preference scores were not appropriate. Since "continuous scores are a linear transformation of Preference Scores for convenience in statistical analyses" (McCaulley, 1990, p. 184), they likewise provide a measurement of an individual's agreement with the preferred cognitive function but not with the non preferred cognitive function.

More importantly, however, by using these scores, important information is

not discarded. Many MBTI/cognitive style studies (Garceau, 1986; Henderson & Nutt, 1980; Hunter & Levy, 1982; Kerin & Slocum, 1981) have used the MBTI to sort subjects into cognitive style categories and then have used various analyses of variance techniques on the data. The researchers have taken intervally scaled data and converted them to the nominal level of scale by sorting subjects into discrete cognitive style categories as if the subjects' agreement with each cognitive function were equal. However, the conversion of intervally scaled variables to the nominal level causes the loss of information. As Thompson (1981, p. 8) has stated, "When we reduce interval level of scale to the nominal level of scale we are doing nothing less than thoughtlessly throwing away information which we previously went to some trouble to collect." Cohen (1968, p. 41) has described the unnecessary use of OVA methods as "squandering much information."

Finally, raw scores permit the use of correlation and regression methods, such as canonical correlation analysis, which was used in the present study. Canonical correlation analysis was the statistical technique which was employed because it subsumes multiple regression as a special case. As Baggaley (1981), has noted, canonical correlation is the most general case of the general linear model. Knapp (1978) demonstrated that canonical correlation analysis subsumes all other parametric tests, including multiple regression, as special cases. Thompson (1988) used a hypothetical data set to illustrate how canonical analyses give the same results as t tests, correlations, ANOVA, MANOVA, multiple regression, and discriminant analysis.

Analyses were conducted for the IPQ in its entirety, the IPQ eliminating the eighth scenario, and the IPQ eliminating the eighth and the ninth scenarios. During the pilot test of the IPQ, it was discovered that the eighth scenario, which concerned an anonymous bomb threat, evoked extremely high scores for the

information choice which matched the ST cognitive style but consistently low scores for the other three cognitive style information choices from all the respondents, despite their cognitive style. Subsequent interviews with several of the pilot study participants revealed that the subjects feared taking unnecessary chances with the lives of the children. They therefore gave a high rating to the ST choice ("Follow the standard procedures outlined in the policy manual") on the assumption that the policy manual demanded immediate evacuation of the students from the school building. In most decision situations, however, life is not threatened, and mixed cognitive styles will be reflected in the information preferences. Because the over-inflated ratings for the ST information choice of the eighth scenario was non-typical, it was decided to eliminate the eighth scenario in one of the analyses.

The ninth scenario also contained a possible life-threatening situation concerning suicide prevention following the fictionalized suicide of a student during the Christmas holidays. Although the situation did not pose the same degree of emergency as the eighth scenario, it was decided to run an additional analysis on the data after eliminating the eighth and the ninth scenarios in the event that responses to the ninth scenario might likewise be non-typical.

Results

The preliminary results indicated that the predominant cognitive style of the group of principals and assistant principals was Sensing Thinking; 26 subjects, or 40.6%, were classified ST according to the MBTI. The second largest group of administrators emerged with the Sensing Feeling style (17 subjects, or 26.6%). The third largest group was NT (11 subjects, or 17.2%), followed closely by NF (10 subjects, or 15.6%). The results are presented in Table 1.

[Insert Table 1 here.]

The average IPQ information preference scores (on a scale of 1-60) coincided

well with the percentage of subjects represented by each cognitive style. The exception was the relatively lower NT score. This might be explained by the fact that the school setting, with its emphasis on the welfare of children, may not be conducive for exercising the NT style of information choice with its inclination toward scientific theory or abstract relationships. Results of the IPQ information preference scores are summarized in Table 2.

[Insert Table 2 here.]

Another fact which should be noted is the relatively narrow range (38.7 - 49.9) of the average information preference scores. This close range indicates that all four information preference choices were considered above average in importance. A comparison between the average scores for the entire group of 64 subjects and the two subgroups of 53 principals and 11 assistant principals can be drawn by examining Table 2.

Although a canonical correlation analysis does provide a measure of the extent of the relationship between cognitive function scores and information preference scores, it does not indicate which specific functions correlate with which specific information preference scores. For this, two crosstabular analyses were conducted. The first cross analysis of the data revealed that, in general, each cognitive style type chose its own type of information preference as most important. Twenty-one (80.8%) of the 26 ST cognitive style participants rated the ST information preference as the highest or second highest in importance, while 16 (94.1%) of the 17 SF participants rated the SF information choice as the highest or second highest in importance, and six (60%) of the 10 NF participants rated the NF information choice as the highest or second highest in importance. The only exceptions were the NT participants, only one (9.1%) of 11 participants who rated the NT information choice as most important.

The second crosstabular analysis was conducted between the average scores of

each information preference category according to each MBTI cognitive style category. This analysis was another indication of the general trend of individuals to choose as most important the information choices which were written to match their own cognitive styles. However, each cognitive style considered the information choices written to match other cognitive style as above average in importance in helping them come to decisions. These results are summarized in Table 3.

[Insert Table 3 here.]

The shared variance of the MBTI cognitive function scores and information preference scores was measured by the squared canonical correlation. The squared canonical correlation for the total group of 64 subjects, using all 12 scenarios, was .16 on the first canonical function. This means that cognitive style can explain approximately 16% of the variance in information preference scores on the IPQ. However, when the eighth ("bomb threat") scenario was eliminated, the squared canonical correlation rose to .21 on the first canonical correlation. In other words, in less volatile situations, cognitive style can explain 21% of the variance in information preference scores. Canonical results for the total group of 64 subjects, using all 12 scenarios and eliminating the eighth scenario, are summarized in Tables 4 and 5.

[Insert Tables 4 and 5 here.]

Although the F approximation was significant only at the .11 alpha level, statistical significance is mainly influenced by sample size; that is, the greater the number of subjects, the more likely it is that statistical significance will be found. Small sample sizes require extraordinarily high correlations for statistical significance levels to be reached.

Statistical significance, however, is not an indication of importance of the study. A better indication of importance is effect size—the measure of the

percentage of the variance of the dependent variables that is shared with the independent variables. The squared canonical correlation provides such a measure, as it indicates the degree to which the dependent variables' variance is shared with, or can be explained by, the independent variables. When eliminating the eighth scenario from the analysis, 21% of the variance of information preference scores can be explained by MBTI cognitive function scores. When the eighth and the ninth scenarios were eliminated from the analysis, the squared canonical correlation was .20, or 20% predictive ability. The canonical results for this third analysis are summarized in Table 6.

[Insert Table 6 here.]

For the subgroup of 53 principals, the greatest shared variance was also found when the eighth scenario only was eliminated. Retaining all 12 scenarios indicated a predictive ability or shared variance of 20%, while eliminating the eighth scenario indicated a predictive ability or shared variance of 25%, and eliminating the eighth and the ninth scenarios indicated a predictive ability or shared variance of 24%. These canonical results are summarized in Tables 7 through 9.

[Insert Tables 7 through 9 here.]

Although the F approximation for the subgroup of principals was significant at only the .13 alpha level, the group of 53 subjects was too small to produce statistically significant results. The effect size (25%), which indicates the shared variance when eliminating the eighth scenario, however, is reasonable.

Statistical significance, moreover, is also neither an indication of the replicability nor the generalizability of the study. Invariance procedures are better indices of generalizability. The program RELATE (Veldman, 1978) is an invariance procedure which performs a Procrustean rotation of "best fit" on split halves of the sample, both when all 12 scenarios were used and when the eighth

scenario was eliminated. The RELATE results indicated that the test r's were high for both analyses among the four cognitive functions across the two solutions: .97, .99, .91, and 1.0 for the analysis which retained all 12 scenarios; 1.0, 1.0, .97, and .99 for the analysis which eliminated the eighth scenario. The test r's are indications of the goodness of fit of the variables across the two solutions. The mean item R, which is an indication of how well the variables correlated from one matrix to the other, was high for each analysis: .97 for the analysis which retained all 12 scenarios and .99 for the analysis which eliminated the eighth scenario. The cosines along the diagonal were also very high: .94 and .94 for the analysis which retained all 12 scenarios, and .96 and .96 for the analysis which eliminated the eighth scenario. These results suggest that the canonical analyses are replicable. In other words, anyone else can run the same test on a similar group and expect to receive the same or similar results. Although replicability across splits of a single sample is not quite the same as generalizability of results across different samples, such analyses do at least give the researcher some idea of how stable results will be over different configurations of subjects.

Another generalizability test which was conducted in the present study was the coefficient alpha, recommended by Cronbach (1951) as a useful estimate for internal consistency reliability. According to Thompson (1989), all reliability estimates come under the umbrella of generalizability theory. The four information scales of the Information Preference Questionnaire were found to be internally consistent and, therefore, reliable estimates of the hypothetical constructs of cognitive style information preference. The reliability coefficients are summarized in Table 10.

[Insert Table 10 here.]

Commonality analysis, a partitioning procedure which facilitates

interpretation of regression and canonical results, was performed on the data to discover the unique and common variance explained by individual independent variables. Tables 11 and 12 show the regression results, using all possible combinations of independent (predictor) variables on the composite set of dependent variables for the analyses which retained all 12 scenarios and which eliminated the eighth scenario. Tables 13 and 14 show the partitioning formula for the same two analyses, and Tables 15 and 16 show the multivariate commonality results for the two analyses.

[Insert Tables 11 through 16 here.]

The commonality results indicated that Thinking and Feeling were responsible for explaining most of the variance of the composite set of dependent variables. Thus, the Thinking-Feeling dimension of the MBTI seems to be the strongest discriminator in predicting responses to IPQ information preferences.

Implications

The crosstabular and the canonical results offer a positive answer to the research question posed by the study: does cognitive style influence information preference? If the individuals had clearly preferred the information choice representing only their own cognitive styles, there might be implications for the providers of information to design four sets of information data, one for each cognitive style. However, while the individuals generally preferred their own cognitive style of information, the ratings, for the most part, were also high for the other cognitive style information choices. Since the range of scores was relatively narrow for the four information preference categories, there was no clearly dominant information preference. Disseminators of information, then, should provide a variety of styles and forms of information to schools, rather than perpetuate the traditionally typical ST style information, with its emphasis on impersonal "bottom line" facts. Principals appear to value as important not

merely the kind of information which appeals to their own particular cognitive style but also information which appeals to the other cognitive styles.

For example, in the scenario which asked the principals to rate the importance of information in considering the decision of whether or not to initiate an acceleration or enrichment program for the high IQ students, principals were generally interested in the achievement test scores which show the percentage of students who score above the 90th percentile. This type of information is inherently appealing to the ST individual, and it is the kind of information which is typically provided to administrators. However, they were also interested in other factors, such as the potential for access to future opportunities (such as scholarships) that such programs might create for the brighter students. The latter type of information is inherently appealing to the NF individual, but many non-NF principals deemed this kind of factor an important consideration in the decision context.

In another scenario, which asked the respondents to rate the importance of information which would help them evaluate a new teacher, many principals considered well defined lesson plans stating specific objectives in measurable terms to be a significant factor, typical of the ST individual. Many of the same principals also considered a personal observation of the specific behaviors in the teacher's classroom performance, information which appeals to the SF individual, to be of equal importance in helping them come to a decision. Still others equally trusted their instincts about whether a genuine rapport and mutual respect existed between teacher and students. This kind of information is inherently appealing to the NF individual, but many principals who were not NF considered it to be as important as the information constructed to appeal to their own cognitive style.

Therefore, providers of information would produce information which is

appealing to more principals if they reported not merely the "bottom line" statistics on success rates of various programs, for example, but also the opinions and feelings of how these programs affected the individuals enrolled in them—whether a particular program increased students' confidence and self-esteem, or whether the program sparked an interest in a possible new career. In other words, principals seem to desire more than just facts about things; they also seem to be interested in facts about people, in possibilities for people and for the school, and in current patterns of behavior and trends for the future.

These findings also have implications for those university professors who train individuals to be school administrators. The MBTI can be used not only to determine cognitive style of administrative trainees but also to bring them to an awareness about their personal modes of filtering through information as a result of their cognitive style. The university-based trainers could also use this awareness of different perspectives of organizations and the different modes of filtering through various types of information to teach the administrative trainees to work with people of various cognitive styles within the school.

Suggestions for Further Research

Three findings from the study warrant future research: (1) the study identified a general patterning of cognitive style and information preference as predicted; (2) the commonality analysis provided evidence that the Thinking-Feeling dimension seems to exert a strong influence on information preference independently of cognitive style; (3) the fact that some scenarios elicited response patterns different from the norm in this study may suggest that context may have an influence on information preferences independent of cognitive style.

Based on the first finding, that there seems to be a general matching of cognitive style and information preference, a consideration for future research centers on the scores generated by the MBTI. While the MBTI produces scores on

the cognitive *functions* (S, N, T, F), it does not produce scores for the cognitive *styles* (ST, SF, NT, NF). Correlating pure MBTI cognitive *function* scores with information preference scores based on cognitive styles has the potential of confounding the results. An ideal test of the research question requires scores for each cognitive style as opposed to each cognitive function.

Although the study set out to discover if there were a relationship between cognitive style and information preference, it was not possible to calculate a cognitive style score. Reducing the subjects to four nominally scaled cognitive style categories after analyzing their MBTI results would lose valuable information and is not a strong option. Keeping the personality scores as continuous variables and adding the scores for each cognitive function to achieve cognitive style scores would confound the results. If there were some way to calculate discriminating cognitive style scores, more sensitive research could be conducted to discover the influence of cognitive style on information preference as well as other aspects of behavior. Either a new instrument based on the MBTI or a method of calculating cognitive style scores from the current MBTI would facilitate multivariate research in this area.

The second finding—that the Thinking-Feeling dimension seems to be a strong discriminator in predicting responses to the IPQ preference choices—reinforces the usefulness of true cognitive style scores for MBTI research. The Thinking-Feeling dimension captures contrasting MBTI *functions*. If this pair of *functions* appears to work as a strong discriminator of information preferences, the question lingers as to whether cognitive *styles* can explain even greater information preference variation.

Another matter for future research is the possibility that the decision context itself may exert a strong influence on information preferences. Such a study would investigate relationships between individuals' cognitive styles and

their information preference scores on "people-oriented" items of the IPQ as opposed to "issue-oriented" items of the IPQ. A study which would separate information preferences according to decision situations which affect people and those which affect policy might reveal that certain MBTI cognitive styles are more strongly influenced by the Thinking-Feeling dimension, depending upon the kind of decision being made. Perhaps such a study would reveal that the Thinking Feeling dimension exerts the strongest influence with decisions which are either people- or policy-oriented.

Based on the third finding of the present study, then, future research involving a closely studied set of decision contexts which include threats to life or to security as well as routine administrative decisions might reveal certain decision situations in which cognitive style expresses itself more strongly and those situations in which cognitive style is suppressed. If there is a threat to someone's well being in the decision situation—if the outcome of the decision might lead to the dismissal of a teacher, for example, as in the twelfth scenario—that factor might tend to suppress cognitive style differences. It was already discovered that most participants rated the ST response very high in the eighth "bomb threat" scenario because the decision situation involved a threat to the lives of the children, and participants were unwilling to risk their students' lives. The twelfth scenario, which involved a decision about an excessively absent teacher, likewise elicited non-typical responses.

Further studies comparing cognitive style and information preferences in carefully detailed decision contexts may also be useful for those university professors who train school administrators. According to Jung's theory of psychological type, individuals differentiate their dominant function as well as their auxiliary function (which combine to form cognitive style) in the process of individuation. Some individuals, however, develop a further stage, "in which

the other functions are permitted more development, to compensate for any one-sidedness, and the pronounced typical picture is again modified . . . by the unfolding of a fuller and richer expression of human nature" (Van der Hoop, 1939, p. 92). This final stage comes only to people who have developed their type fully but continue growing and learn to transcend their type (Myers, 1980). Barr and Barr (1989) reiterate this notion of transcending one's type in their program for developing leadership ability. Not only is it essential in leadership for individuals to know their own preferences but also to develop the other side of that preference. A true leader, they contend, responds according to the situation. "Matching the response to the appropriateness of the situation is the key" (Barr & Barr, 1989, p. 25).

Transcending one's type has been called "crossing over" (Myers, 1980) and "reframing" (Bolman & Deal, 1984). If individuals can "learn to use an opposite when it is more appropriate than the best-developed processes, they can become adequately skilled in its use and, when needed, can cross over from the natural to the appropriate" (Myers, 1980, p. 120). In a similar manner, Bolman and Deal (1984) suggest that administrators adopt the technique of "reframing," the process of "switching across frames to generate new insights and options" (p. 204).

If future studies can determine that the context of a situation may also be a determinant of information preferences, the implications for those university researchers who train school administrators are multiple. Preparing trainees to become school administrators could include recognition of cognitive style as well as training individuals to transcend their types by developing the inferior functions in order to match their responses and their information filtering processes to the appropriateness of the decision context.

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TABLE 1

MBTI Cognitive Styles for the Total Group and Subgroups of Principals and Assistant Principals

Total Group			Principals		Asst. Principals	
Style	N	%	N	%	N	%
ST	26	40.6%	19	35.8%	7	63.4%
SF	17	26.6%	16	30.2%	1	9.1%
NT	11	17.2%	9	17.0%	2	18.2%
NF	10	15.6%	9	17.0%	1	9.1%
Total		64		53		11

TABLE 2

Average IPQ Scores on a Scale of 1 - 60

for the Total Group of Principals and Assistant Principals

	Total Group (N = 64)			Principals (N = 53)			Asst. Principals (N = 11)		
	All	-#8	-#8,9	All	-#8	-#8,9	All	-#8	-#8,9
ST	47.9	47.6	47.8	47.6	47.3	47.5	49.7	49.2	49.3
SF	46.9	48.4	48.2	46.9	48.4	48.0	47.1	48.8	48.8
NT	38.7	38.8	39.1	39.2	39.2	39.5	36.1	36.7	37.2
NF	43.2	44.1	44.9	43.5	44.2	45.0	42.3	43.7	44.6

All = Analysis retaining all 12 scenarios of the IPQ

-#8 = Analysis eliminating scenario #8 of the IPQ

-#8,9 = Analysis eliminating scenarios #8 & 9 of the IPQ

The four Information Preference Questionnaire (IPQ) scores range from 1 - 60.

TABLE 3

Average IPQ Scores on a Scale of 1 - 60

of Each MBTI Cognitive Style Category

for the Total Group of Principals and Assistant Principals

(N = 64)

MBTI STYLE (N)	ANALYSIS	IPQ ST AVG	IPQ SF AVG	IPQ NT AVG	IPQ NF AVG
ST	All 12 items	49.3	46.8	39.0	43.1
(26)	Minus #8	48.9	47.9	39.5	44.2
	Minus #8, #9	49.1	45.9	39.2	44.9
SF	All 12 items	46.5	47.5	38.7	42.5
(17)	Minus #8	46.0	48.9	39.1	43.0
	Minus #8, #9	45.8	48.3	40.0	44.2
NT	All 12 items	48.3	46.8	38.3	43.1
(11)	Minus #8	48.5	48.9	37.9	44.2
	Minus #8, #9	48.9	49.2	38.9	44.9
NF	All 12 items	46.4	46.3	38.2	45.1
(10)	Minus #8	45.8	48.4	38.4	45.3
	Minus #8, #9	46.4	48.1	38.2	46.1

TABLE 4

Canonical Correlation Analysis Coefficients

on the First Two Canonical Functions

Total Group of Principals and Assistant Principals (n = 64)

Using All 12 Scenarios of the IPQ

Var./ Coeff.	I Func	Stru	Sq Stru	II Func	Stru	Sq Stru	h^2
S	1.398	-.257	.07	1.939	.827	.68	.75
N	1.556	.478	.23	1.253	-.600	.36	.59
T	-.819	-.795	.63	-.639	.295	.09	.72
F	-.048	.749	.56	-.813	-.416	.17	.73
Rc^2	.156562			.109087			
ST	-.868	-.224	.05	.196	.655	.43	.48
SF	1.041	.654	.43	.466	.605	.37	.80
NT	-.063	.279	.08	.946	.514	.26	.34
NF	.294	.484	.23	-1.084	-.096	.01	.24

Note. The h^2 values reported in the table are based on only two of the four functions, e.g., .75 = .07 + .68.

TABLE 5

Canonical Correlation Analysis Coefficients

on the First Two Canonical Functions

Total Group of Principals and Assistant Principals (n = 64)

Eliminating the Eighth Scenario of the IPQ

Var./ Coeff.	I Func	Stru	Sq Stru	II Func	Stru	Sq Stru	h^2
S	1.256	-.308	.09	2.067	.847	.72	.81
N	1.456	.503	.25	1.339	-.572	.33	.58
T	-.985	-.826	.68	.074	.280	.08	.76
F	-.217	.734	.54	.033	-.203	.04	.58
Rc^2	.212029			.103000			
ST	-1.017	-.208	.04	.014	.447	.20	.24
SF	1.152	.647	.42	.200	.338	.11	.53
NT	.147	.169	.03	1.392	.514	.26	.29
NF	.065	.276	.08	-1.309	-.161	.03	.11

Note. The h^2 values reported in the table are based on only two of the four functions, e.g., .81 = .09 + .72.

TABLE 6

Canonical Correlation Analysis Coefficients

on the First Two Canonical Functions

Total Group of Principals and Assistant Principals (n = 64)

Eliminating the Eighth and Ninth Scenarios of the IPQ

Var./ Coeff.	I Func	Stru	Sq Stru	II Func	Stru	Sq Stru	h^2
S	.795	-.451	.20	1.400	.180	.03	.23
N	1.111	.576	.33	1.473	-.014	.00	.33
T	-1.123	-.877	.77	-1.275	.323	.10	.87
F	.362	.734	.54	-1.819	-.649	.42	.96
Rc^2	.201876			.067752			
ST	-9527	-.259	.07	.936	.896	.80	.87
SF	1.078	.608	.37	.378	.738	.54	.91
NT	-.119	.080	.01	-.566	.296	.09	.10
NF	.336	.321	.10	.181	.276	.08	.18

Note. The h^2 values reported in the table are based on only two of the four functions, e.g., .23 = .20 + .03.

TABLE 7

Canonical Correlation Analysis Coefficients

on the First Two Canonical Functions

Subgroup of Principals (n = 53)

Using All 12 Scenarios of the IPQ

Var./ Coeff.	I Func	Stru	Sq Stru	II Func	Stru	Sq Stru	h^2
S	.971	-.407	.17	2.298	.772	.60	.77
N	1.258	.568	.32	1.636	-.502	.25	.57
T	-.844	-.868	.75	-.494	.158	.02	.77
F	-.069	.771	.59	-.551	-.229	.05	.64
Rc^2	.198573			.143637			
ST	-.913	-.330	.11	.311	.703	.49	.60
SF	.1912	.554	.31	.754	.774	.60	.91
NT	-.163	.162	.03	.477	.457	.21	.24
NF	.474	.464	.22	-.845	.023	.00	.22

Note. The h^2 values reported in the table are based on only two of the four functions, e.g., .77 = .17 + .60.

TABLE 8

Canonical Correlation Analysis Coefficients

on the First Two Canonical Functions

Subgroup of Principals (n = 53)

Eliminating the Eighth Scenario of the IPQ

Var./ Coeff.	I Func	Stru	Sq Stru	II Func	Stru	Sq Stru	h^2
S	.737	-.476	.23	2.445	.735	.54	.77
N	1.081	.608	.37	1.822	-.435	.19	.56
T	-.911	-.882	.78	-.229	.093	.01	.79
F	-.143	.764	.58	-.189	-.089	.01	.59
Rc^2	.246067			.138135			
ST	-1.048	-.350	.12	.225	.604	.36	.48
SF	.988	.553	.31	.657	.653	.43	.74
NT	-.007	.054	.00	.886	.451	.20	.20
NF	.309	.285	.08	-1.165	-.031	.00	.08

Note. The h^2 values reported in the table are based on only two of the four functions, e.g., .77 = .23 + .54.

TABLE 9

Canonical Correlation Analysis Coefficients

on the First Two Canonical Functions

Subgroup of Principals (n = 53)

Eliminating the Eighth and Ninth Scenarios of the IPQ

Var./ Coeff.	I Func	Stru	Sq Stru	II Func	Stru	Sq Stru	h^2
S	-.333	.544	.30	2.546	.305	.09	.39
N	-.713	-.620	.38	2.458	.036	.00	.38
T	.975	.910	.83	-.509	.189	.04	.87
F	.192	-.771	.59	-.780	-.297	.09	.68
Rc^2	.235606			.112230			
ST	1.040	.413	.17	.678	.695	.48	.65
SF	-.869	-.483	.23	.757	.804	.65	.88
NT	.117	-.024	.00	-.448	.137	.02	.02
NF	-.492	-.312	.10	-.239	.079	.01	.11

Note. The h^2 values reported in the table are based on only two of the four functions, e.g., .39 = .30 + .09.

TABLE 10

Alpha Coefficients for Information Scales of the Information Preference Questionnaire

	Total Group (N = 64)			Principals (N = 53)			Asst. Principals (N = 11)		
	All	-#8	-#8,9	All	-#8	-#8,9	All	-#8	-#8,9
Tot	.90	.90	.89	.91	.91	.90	.85	.84	.81
ST	.79	.77	.74	.78	.76	.74	.83	.83	.77
SF	.72	.72	.69	.72	.71	.68	.69	.79	.78
NT	.76	.77	.76	.77	.79	.78	.67	.63	.52
NF	.73	.72	.72	.76	.77	.77	.50	.29	.22

Tot = Total reliability of all items in analyses

All = Analysis retaining all 12 scenarios of the IPQ

-#8 = Analysis eliminating scenario #8 of the IPQ

-#8,9 = Analysis eliminating scenarios #8 & 9 of the IPQ

TABLE 11

Prediction of Composite IPQ Scores

Using Alternate Predictor Variable Combinations

Total Group of Principals and Assistant Principals (n = 64)

Using All 12 Scenarios of the IPQ

Predictor Set	Variables in Set	Rc^2
S	ZS	.010335
N	ZN	.035790
T	ZT	.087711
F	ZF	.098853
SN	ZS, ZN	.069703
SF	ZS, ZF	.088124
NF	ZN, ZF	.098778
ST	ZS, ZT	.0988976
TF	ZT, ZF	.100729
NT	ZN, ZT	.110516
STF	ZS, ZT, ZF	.100807
NTF	ZN, ZT, ZF	.111359
SNF	ZS, ZN, ZF	.133032
SNT	ZS, ZN, ZT	.156482
SNTF	ZS, ZN, ZT, ZF	.156562

The Rc^2 for predictor set SNTF (using all four predictor variables in combination) equals the squared canonical correlation, within rounding error.

TABLE 12

Prediction of Composite IPQ Scores

Using Alternate Predictor Variable Combinations

Total Group of Principals and Assistant Principals (n = 64)

Eliminating the Eighth Scenario of the IPQ

Predictor Set	Variables in Set	Rc_2
S	ZS	.020155
N	ZN	.053704
T	ZT	.144690
F	ZF	.114108
SN	ZS, ZN	.086504
SF	ZS, ZF	.116634
NF	ZN, ZF	.132794
ST	ZS, ZT	.1457956
TF	ZT, ZF	.144790
NT	ZN, ZT	.162539
STF	ZS, ZT, ZF	.145864
NTF	ZN, ZT, ZF	.162604
SNF	ZS, ZN, ZF	.165980
SNT	ZS, ZN, ZT	.209802
SNTF	ZS, ZN, ZT, ZF	.212029

The Rc^2 for predictor set SNTF (using all four predictor variables in combination) equals the squared canonical correlation, within rounding error.

TABLE 13

Calculations of Unique and Common Variance Partitions

Total Group of Principals and Assistant Principals (n = 64)

Using All 12 Scenarios of the IPQ

Set	Partition	Result
Unique to ZS	SNTF - NTF	.045203
Unique to ZN	SNTF - STF	.055754
Unique to ZT	SNTF - SNF	.023529
Unique to ZF	SNTF - SNT	.000080
Common to ZS, ZN	STF + NTF - TF - SNTF	-.045124
Common to ZS, ZT	SNF + NTF - NF - SNTF	-.010948
Common to ZS, ZF	SNT + NTF - NT - SNTF	.000763
Common to ZN, ZT	SNF + STF - SF - SNTF	-.010846
Common to ZN, ZF	SNT + STF - ST - SNTF	.001751
Common to ZT, ZF	SNT + SNF - SN - SNTF	.063250
Common to ZS, ZN, ZT	TF + NF + SF + SNTF - F - NTF - STF - SNF	.011283
Common to ZS, ZN, ZF	TF + NF + ST + SNTF - T -NTF - STF - SNT	-.012457
Common to ZS, ZT, ZF	NF + NT + SN + SNTF - N - NTF - SNF - SNT	-.001113
Common to ZN, ZT, ZF	SF + ST + SN + SNTF -S - STF - SNF - SNT	.012708
Common to ZS, ZN, ZT, ZF	F + T + N + S + NTF + STF + SNF + SNT - TF - NF - NT - SF - ST - SN - SNTF	.010991

TABLE 14

Calculations of Unique and Common Variance Partitions

Total Group of Principals and Assistant Principals (n = 64)

Eliminating the Eighth Scenario of the IPQ

Set	Partition	Result
Unique to ZS	SNTF - NTF	.049424
Unique to ZN	SNTF - STF	.066165
Unique to ZT	SNTF - SNF	.046049
Unique to ZF	SNTF - SNT	.002226
Common to ZS, ZN	STF + NTF - TF - SNTF	-.048350
Common to ZS, ZT	SNF + NTF - NF - SNTF	-.016238
Common to ZS, ZF	SNT + NTF - NT - SNTF	-.002161
Common to ZN, ZT	SNF + STF - SF - SNTF	-.016819
Common to ZN, ZF	SNT + STF - ST - SNTF	-.002158
Common to ZT, ZF	SNT + SNF - SN - SNTF	.077249
Common to ZS, ZN, ZT	TF + NF + SF + SNTF - F - NTF - STF - SNF	.017690
Common to ZS, ZN, ZF	TF + NF + ST + SNTF - T -NTF - STF - SNT	-.027553
Common to ZS, ZT, ZF	NF + NT + SN + SNTF - N - NTF - SNF - SNT	.001775
Common to ZN, ZT, ZF	SF + ST + SN + SNTF -S - STF - SNF - SNT	.019162
Common to ZS, ZN, ZT, ZF	F + T + N + S + NTF + STF + SNF + SNT - TF - NF - NT - SF - ST - SN - SNTF	.015822

TABLE 15

Multivariate Commonality Results

Total Group of Principals and Assistant Principals (n = 64)

Using All 12 Scenarios of the IPQ

Partition	ZS	ZN	ZT	ZF
Unique to ZS	.045203			
Unique to ZN		.055754		
Unique to ZT			.023529	
Unique to ZF				.000080
Common to ZS,ZN	<u>-.045124</u>	<u>-.045124</u>		
Common to ZS,ZT	-.010948		-.010948	
Common to ZS,ZF	-.000763			-.000763
Common to ZN,ZT		-.010846	-.010846	
Common to ZN,ZF		.001751		.001751
Common to ZT,ZF			<u>.063250</u>	<u>.063250</u>
Common to ZS,ZN,ZT	.011283	.011283	.011283	
Common to ZS,ZN,ZF	-.012457	-.012457		-.012457
Common to ZS,ZT,ZF	-.001113		-.001113	-.001113
Common to ZN,ZT,ZF		.012708	.012708	.012708
Common to ZS,ZN,ZT,ZF	.010991	.010991	.010991	.010991
Sum of the Partitions	-.001402	.024060	.098854	.075973
r^2 of Predictor with canonical composite of cognitive style IPQ scores	.14%	2.41%	9.89%	7.60%

Note. The underlined commonality coefficients should be large because these variable pairs are parts of a given MBTI scale.

TABLE 16

Multivariate Commonality Results

Total Group of Principals and Assistant Principals (n = 64)

Eliminating the Eighth Scenario of the IPQ

Partition	ZS	ZN	ZT	ZF
Unique to ZS	.049424			
Unique to ZN		.066165		
Unique to ZT			.046049	
Unique to ZF				.002226
Common to ZS,ZN	<u>-.048350</u>	<u>-.048350</u>		
Common to ZS,ZT	-.016238		-.016238	
Common to ZS,ZF	-.002161			-.002161
Common to ZN,ZT		-.016819	-.016819	
Common to ZN,ZF		-.002158		-.002158
Common to ZT,ZF			<u>.077249</u>	<u>.077249</u>
Common to ZS,ZN,ZT	.017690	.017690	.017690	
Common to ZS,ZN,ZF	-.027553	-.027553		-.027553
Common to ZS,ZT,ZF	.001775		.001775	.001775
Common to ZN,ZT,ZF		.019162	.019162	.019162
Common to ZS,ZN,ZT,ZF	.015822	.015822	.015822	.015822
Sum of the Partitions	-.009591	.023959	.144690	.084362
r^2 of Predictor with, canonical composite of cognitive style IPQ scores	.96%	2.40%	14.47%	8.44%

Note. The underlined commonality coefficients should be large because these variable pairs are parts of a given MBTI scale.